

# Penn Cambria Curriculum

<b>Course Name</b>	<b>Honors Earth and Environment</b>
<b>Length of Course</b>	<i>1 credit (1 period per day for a semester in a block schedule)</i>
<b>Grade Level</b>	9
<b>Prerequisites</b>	<i>93% or higher in Grade 8 Science</i>
<b>Course Description</b>	<p><i>This is a more rigorous course that includes the same units and content as Earth/Environmental Science. However, this course will involve a more in-depth study of the content including additional information, readings, activities, discussion and evaluations.</i></p> <p><i>This course will focus on a study of the earth, environment and ecology concentrating on the interrelationship of the geosphere, the biosphere, the hydrosphere and the atmosphere. The course includes topics of current interest such as natural resources, pollution, watersheds and the impact of technological advances.</i></p>
<b>Units of Study</b>	<p><i>Geosphere</i></p> <p><i>Biosphere</i></p> <p><i>Hydrosphere</i></p> <p><i>Atmosphere</i></p>
<b>Materials</b>	<p><i>Text: <u>Environment and Ecology for Pennsylvania: Meeting the Standards</u> Pearson/ Globe Fearon c2003</i></p> <p><i>Supplemental Materials: <u>Earth Science and the Environment 4<sup>th</sup> Edition</u> Thomson Brooks/Cole c2007, Teacher created resources, Web-based resources</i></p>

At Penn Cambria High School, all core subject courses are aligned to the Pennsylvania Academic Standards and focus on ensuring students have a solid understanding of core concepts. In addition, all courses encourage critical thinking and an in-depth analysis of subject matter while building a strong foundation in content. The primary goal of the honors level curriculum alternative for these core courses is to provide students with a more in-depth study of the concepts by deepening the academic study and more academic reading. Students in the honors level of a core course will be expected to engage in analysis, evaluation and synthesis level activities with more frequency and for a longer duration than that found in the non-honors level course.

The following PA Academic Standards for Science and Technology are integrated in all units within the curriculum. Unit specific standard alignment can be found within each unit.

## 3.1 Unifying Themes

- 3.1.10. A – Discriminate among the concepts of systems, subsystems, feedback and control in solving technological problems.
- 3.1.10. B – Describe concepts of models as a way to predict and understand science and technology.
- 3.1.10. C – Apply patterns as repeated processes or recurring elements in science and technology.
- 3.1.10. D – Apply scale as a way of relating concepts and ideas to one another by some measure.
- 3.1.10. E – Describe patterns of change in nature, physical and man made systems.

## 3.2 Inquiry and Design

- 3.2.10. A – Apply knowledge and understanding about the nature of scientific and technological knowledge.
- 3.2.10. B – Apply process knowledge and organize scientific and technological phenomena in varied ways.
- 3.2.10. C – Apply the elements of scientific inquiry to solve problems.
- 3.2.10. D – Identify and apply the technological design process to solve problems.

### **3.8 Science, Technology and Human Endeavors**

- 3.8.10. A – Analyze the relationship between societal demands and scientific and technological enterprises.
- 3.8.10. B - Analyze how human ingenuity and technological resources satisfy specific human needs and improve the quality of life.
- 3.8.10. C - Evaluate possibilities, consequences, and impact of scientific and technological solutions.

### **PA Core Standards for Reading and Writing in Science and Technical Subjects**

- CC.3.5.9-10.A** Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.
- CC.3.5.9-10.B** Determine the central ideas or conclusions of a text; trace's the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text.
- CC.3.5.9-10.C** Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.
- CC.3.5.9-10.D** Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context.
- CC.3.5.9-10.E** Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., *force*, *friction*, *reaction-force*, *energy*).
- CC.3.5.9-10.F** Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, defining the question the author seeks to address.
- CC.3.5.9-10.G** Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.
- CC.3.5.9-10.H** Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem.
- CC.3.5.9-10.I** Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts.
- CC.3.5.9-10.J** Read and comprehend science/technical texts in the grades 9-10 text complexity band independently and proficiently.
- CC.3.6.9-10.A** Write arguments focused on discipline-specific content.
- CC.3.6.9-10.B** Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes.
- CC.3.6.9-10.C** Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
- CC.3.6.9-10.D** Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.
- CC.3.6.9-10.E** Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically.
- CC.3.6.9-10.F** Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject under investigation.
- CC.3.6.9-10.G** Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation.
- CC.3.6.9-10.H** Draw evidence from informational texts to support analysis, reflection, and research.
- CC.3.6.9-10.I** Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.

## Unit 1: Geosphere

**Estimated Time:** 25-30 class periods

### Standard Alignment:

- 3.5.10. A – Relate earth features and processes that change the earth.
- 3.5.10. B – Explain sources and uses of earth resources.
- 4.2.10. A – Explain that renewable and nonrenewable resources supply energy and materials.
- 4.2.10. B – Evaluate factors affecting availability of natural resources.
- 4.2.10. C – Analyze how man-made systems have impacted the management and distribution of natural resources.
- 4.8.10. A – Analyze how society's needs relate to the sustainability of natural resources needs.
- 4.8.10. B – Analyze the relationship between the use of natural resources and sustaining our society.

### Curricular Objectives:

- Describe the characteristics of the Earth's four spheres/systems.
- Compare and contrast the theories of Gradualism and catastrophism.
- Analyze the threshold effect and feedback mechanisms.
- Correlate rock and fossil evidence to general geologic time periods in the history of the earth.
- Identify the location and uses of strategic minerals and resources.
- Evaluate the impact of various extraction techniques of strategic minerals and earth resources in the world using maps generated by global information systems.
- Evaluate the impacts of using non-renewable energy resources and investigate alternatives.
- Apply knowledge of radioactive decay and methods used to assess the use of various earth materials and structures.
- Identify and describe the layers of the Earth's geosphere.
- Evaluate and interpret geologic history using geologic maps.

### Assessments/ Measurement of Objectives:

- |                           |                             |
|---------------------------|-----------------------------|
| • Objective quizzes/tests | • Projects                  |
| • Class work /activities  | • Writing based assessments |
| • Homework                | • Lab observation/ reports  |

### Suggested Methods of Instruction / Learning Activities:

- |                                    |  |
|------------------------------------|--|
| • Lab activities                   | • Study stations                         |
| • Lab reports                      | • Internet/websites activities           |
| • Simulations                      | • Research activities                    |
| • Individual and/or group projects | • Reading in the content area activities |
| • Cooperative learning activities  | • Open ended response                    |

## Unit 2: Biosphere

**Estimated Time:** 25-30 class periods

### Standard Alignment:

- 3.3.10 C Explain how genetic information is inherited and expressed.
- 3.3.10 D Explain the mechanisms of the theory of evolution.
- 4.6.10 A Explain the biotic and abiotic components of an ecosystem and their interaction.
- 4.6.10 B Explain how cycles affect the balance in an ecosystem.
- 4.6.10 C Analyze how ecosystems changes over time.
- 4.7.10 A Explain the significance of diversity in ecosystems.

### Curricular Objectives:

- Interpret geological evidence supporting the Theory of Evolution.
- Explain how natural selection can impact allele frequencies of a population. (BIO.B.3.1.1)
- Analyze the factors that can contribute to the development of new species (e.g., isolating mechanisms, genetic drift, founder effect, migration). (BIO.B.3.1.1)
- Explain how genetic mutations may result in genotypic and phenotypic variations within a population. (BIO.B.3.1.3)
- Interpret evidence supporting the theory of evolution (i.e., fossil, anatomical, physiological, embryological, biochemical, and universal genetic code). (BIO.B.3.2.1)
- Distinguish between the scientific terms: hypothesis, inference, law, theory, principle, fact, and observation. (BIO.B.3.3.1)
- Describe how energy flows through an ecosystem (e.g., food chains, food webs, energy pyramids). (BIO.B.4.2.1)
- Describe biotic interactions in an ecosystem (e.g., competition, predation, symbiosis). (BIO.B.4.2.2)
- Describe how matter recycles through an ecosystem (i.e., water cycle, carbon cycle, oxygen cycle, and nitrogen cycle). (BIO.B.4.2.3)
- Describe the levels of ecological organization (i.e., organism, population, community, ecosystem, biome, and biosphere). (BIO.B.4.1.1)
- Describe characteristic biotic and abiotic components of aquatic and terrestrial ecosystems. (BIO.B.4.1.2)
- Describe the effects of limiting factors on population dynamics and potential species extinction. (BIO.B.4.2.5)
- Describe how ecosystems change in response to natural and human disturbances (e.g., climate changes, introduction of nonnative species, pollution, fires). (BIO.B.4.2.4)

### Assessments/ Measurement of Objectives:

- |                           |                             |
|---------------------------|-----------------------------|
| • Objective quizzes/tests | • Projects                  |
| • Class work /activities  | • Writing based assessments |
| • Homework                | • Lab observation/ reports  |

### Suggested Methods of Instruction / Learning Activities:

- |                                    |  |
|------------------------------------|--|
| • Lab activities                   | • Study stations                         |
| • Lab reports                      | • Internet/websites activities           |
| • Simulations                      | • Research activities                    |
| • Individual and/or group projects | • Reading in the content area activities |
| • Cooperative learning activities  | • Open ended response                    |

## Unit 3: Hydrosphere

**Estimated Time:** 15-20 class periods

### Standard Alignment:

- 3.5.10. A – Relate earth features and processes that change the earth.
- 3.5.10. B – Explain sources and uses of earth resources.
- 3.5.10. D – Assess the value of water as a resource.
- 4.1.10. A – Describe changes that occur from a stream's origin to its final outflow.
- 4.1.10. B – Explain the relationship among landforms, vegetation and the amount and speed of water.
- 4.1.10. C – Describe the physical characteristics of a stream and determine the types of organisms found in aquatic environments.
- 4.1.10. D – Describe the multiple functions of wetlands.
- 4.4.10. B – Assess the influence of agricultural science on farming practices.
- 4.5.10. B – Analyze health benefits and risks associated with integrated pest management.

### Curricular Objectives:

- Review the processes involved in the water cycle.
- Assess the natural and man made factors that affect the availability of clean water.
- Describe changes by tracing a specific river's origin back to its headwaters including its major tributaries.
- Analyze a stream's physical characteristics.
- Describe how topography influences streams.
- Explain the influence of mountains on precipitation.
- Explain how vegetation affects storm water runoff.
- Delineate the boundaries of a watershed.
- Describe factors that affect the quality of groundwater.
- Explain how the speed of water and vegetation cover relates to erosion.
- Describe wetlands in terms of their effects (e.g., habitat, flood, buffer zones, prevention areas, nurseries, food production areas).
- Explain how a wetland influences water quality, wildlife and water retention.
- Identify the health risks associated with chemicals used in common pesticides.
- Explain the differences between salt and fresh water.

### Assessments/ Measurement of Objectives:

- Objective quizzes/tests
- Class work /activities
- Homework
- Projects
- Writing based assessments
- Lab observation/ reports

### Suggested Methods of Instruction / Learning Activities:

- Lab activities
- Lab reports
- Simulations
- Individual and/or group projects
- Cooperative learning activities
- Study stations
- Internet/websites activities
- Research activities
- Reading in the content area activities
- Open ended response

## Unit 4: The Atmosphere

**Estimated Time:** 6-10 class periods

### **Standard Alignment:**

3.5.10. C – Interpret meteorological data.

3.7.10. B – Apply appropriate instruments and apparatus to examine a variety of objects and processes.

4.3.10 B - Explain how multiple variables determine the effects of pollution on environmental health, natural processes and human practice.

### **Curricular Objectives:**

- Describe weather events and the climate patterns created on a global level.
- Analyze meteorological information from on-line sources to predict weather patterns.
- Describe how weather and climate involve the transfer of energy in and out of the atmosphere.
- Explain how unequal heating of the air, ocean and land produces winds and ocean currents.
- Analyze the energy transformations that occur during the greenhouse effect and predict long-term effects of global climate caused by increased pollutants entering the atmosphere.
- Analyze the mechanisms that drive weather and climate.
- Review the processes of cloud formation.
- Review the major layers of the Earth's atmosphere and the features of each.

### **Assessments/ Measurement of Objectives:**

- Objective quizzes/tests
- Class work /activities
- Homework
- Projects
- Writing based assessments
- Lab observation/ reports

### **Suggested Methods of Instruction / Learning Activities:**

- Lab activities
- Lab reports
- Simulations
- Individual and/or group projects
- Cooperative learning activities
- Study stations
- Internet/websites activities
- Research activities
- Reading in the content area activities
- Open ended response